

# Dealing with Inconsistency of Self-Perceived Health Changes in Pre- and Post-Deployment Health Assessment

2<sup>nd</sup> of 7 Presentations for DEEP Update

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# THE DEEP

## The Deployment Environmental Epidemiology Project

US Army Center for Health Promotion and Preventive Medicine  
Force Health Protection, Louisville, KY Aug 2005



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# Self-Perceived Health Changes In Pre- and Post-Deployment Health Assessment

- There are two ways to obtain the self-perceived health changes from pre- and post-health assessment questionnaires (DD Form 2795/2796).
  1. Direct measure
  2. Indirect measure

# Two Methods to Determine Health Change During Deployment

## Direct Method

Post Deployment

*Please answer all questions in relation to THIS deployment*

1. Did your health change during this deployment?

- ☐ Health stayed about the same or got better  
☐ Health got worse

4. Did you receive any vaccinations just before or during this deployment?

- ☐ Smallpox (leaves a scar on the arm)  
☐ Anthrax

## Indirect Method

Pre Deployment

**Health Care Provider Only**

SERVICE MEMBER'S SOCIAL SECURITY # [ ] [ ] [ ] — [ ] [ ] — [ ] [ ] [ ] [ ]

Post-Deployment Health Care Provider Review, Interview, and Assessment

Interview

1. Would you say your health in general is:

- ☐ Excellent ☐ Very Good ☐ Good ☐ Fair ☐ Poor

2. Do you have any medical or dental problems that developed during this deployment?

- ☐ Yes ☐ No

**VS**

Post Deployment

**Health Care Provider Only**

SERVICE MEMBER'S SOCIAL SECURITY # [ ] [ ] [ ] — [ ] [ ] — [ ] [ ] [ ] [ ]

Post-Deployment Health Care Provider Review, Interview, and Assessment

Interview

1. Would you say your health in general is:

- ☐ Excellent ☐ Very Good ☐ Good ☐ Fair ☐ Poor

2. Do you have any medical or dental problems that developed during this deployment?

- ☐ Yes ☐ No



# The Direct Measure

- Use question #1 from DD Form 2796 (self-administered questionnaire)

Did your health change during this deployment?

- Health stayed about the same or got better
- Health got worse

# The Indirect Measure

- Calculate the difference in answering the same question (interviewed by a health care provider) in pre- and post-deployment health assessment (DD Form 2795 and 2796).

Would you say your health in general is:

- Excellent
- Very Good
- Good
- Fair
- Poor

# The Indirect Measure (Cont'd)

- **Classify the changes in self-rated overall health status from pre- to post-deployment into two categories:**
  1. Health status stayed the same or better (example: from "Fair" in pre-deployment to "Good" in post-deployment)
  2. Health status got worse (example: from "Good" in pre-deployment to "Fair" in post-deployment)



# Hypothesis

- The direct and indirect measures of self-perceived health changes during deployment are consistent.

# Data Source

- DD form 2795 and 2796 were obtained from AMSA for about 600 service members with records indicating deployment to Afghanistan from December 2001 to December 2003.

# Comparison between the Direct and Indirect Measures

Self-Perceived Health Changes		Direct Measure		Total
		Same/Better	Worse	
Indirect Measure	Same/Better	291 (49%)	30 (5%)	321 (54%)
	Worse	178 (30%)	98 (16%)	276 (46%)
Total		469 (79%)	128 (21%)	597 (100%)



# Comparison Summary

- Health got worse:
  - By direct measure, 21%
  - By indirect measure, 46%
- Consistent cases, 65%
- Inconsistent cases, 35%

# Dilemma

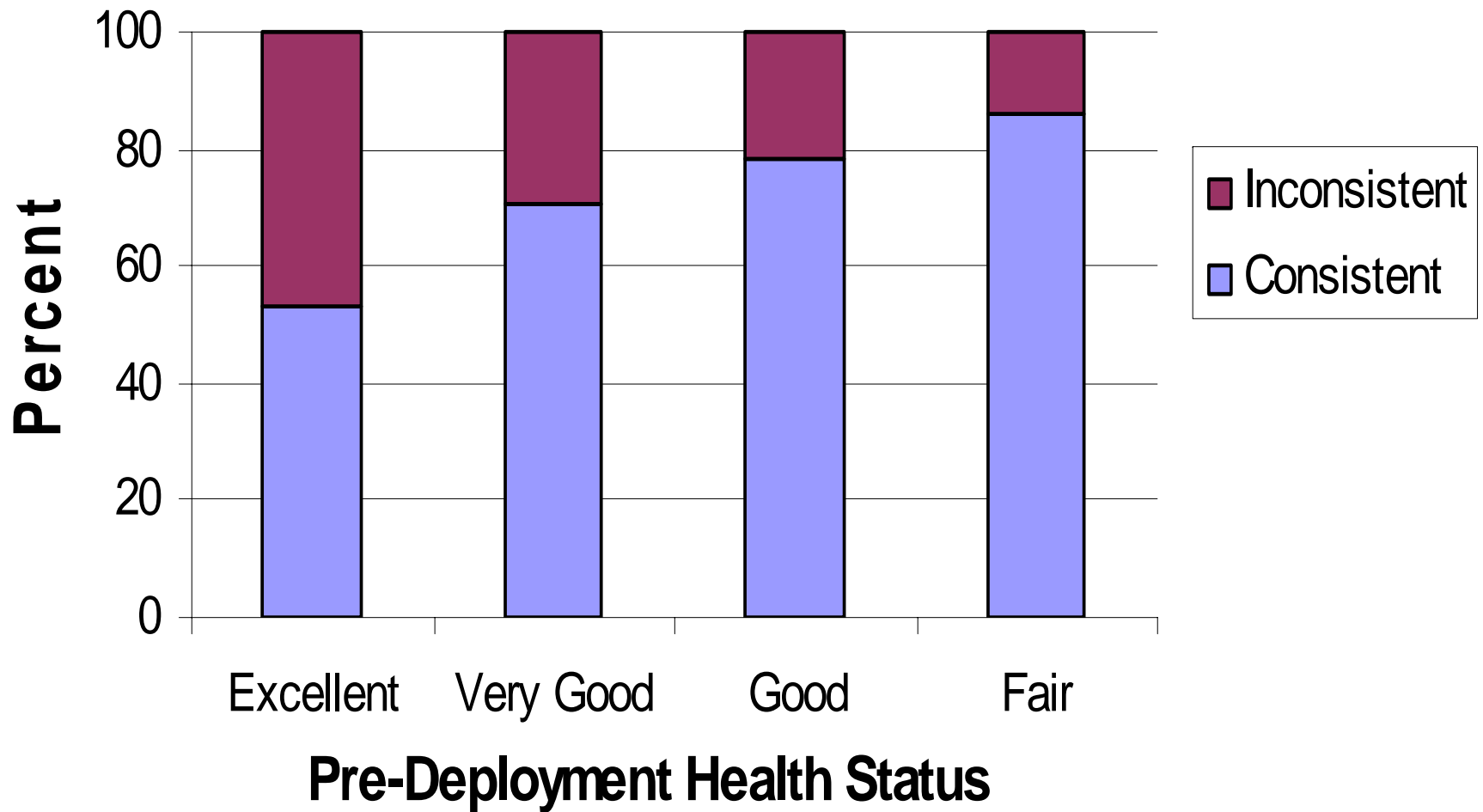
- With the substantial discrepancy in percentages of the self-perceived declining health status between the direct and indirect measures, which one should be used as a health outcome?

# Evaluation of Respondent Inconsistency

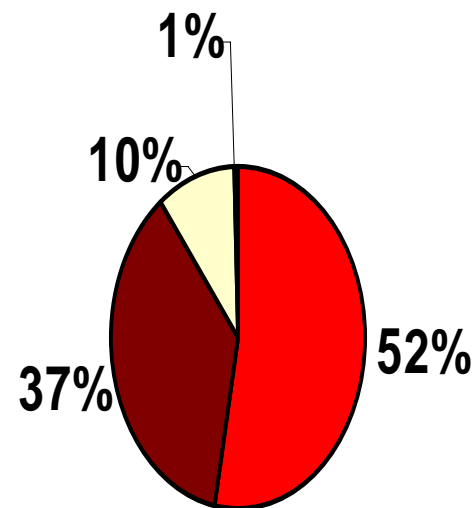
- Top ranked factors contributing the respondent inconsistency, determined by a CART model with inconsistent status (Yes/No) as a dependent variable.
  - Pre-deployment self-rated health status (baseline)
  - Deployment duration
  - Pay Grade
  - Exposure indices (1<sup>st</sup> and 2<sup>nd</sup> orders)
  - Mental stress index
  - Education levels
  - Age
  - Component (active, reserve and guard)



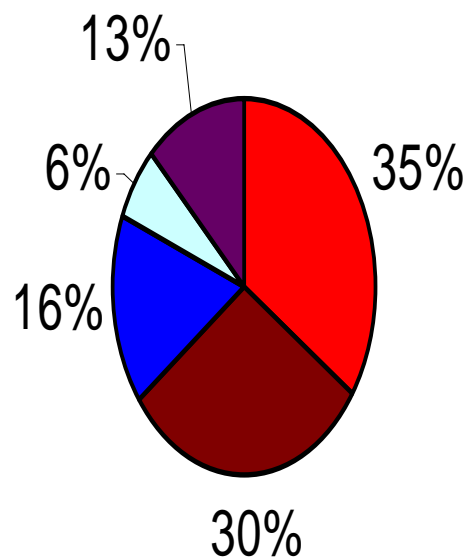
# Inconsistency of Self-Reported Health Changes by Pre-Deployment Health Status



# Proportion of Inconsistent Cases of Self-Reported Health Changes by Pre-Deployment Health Status



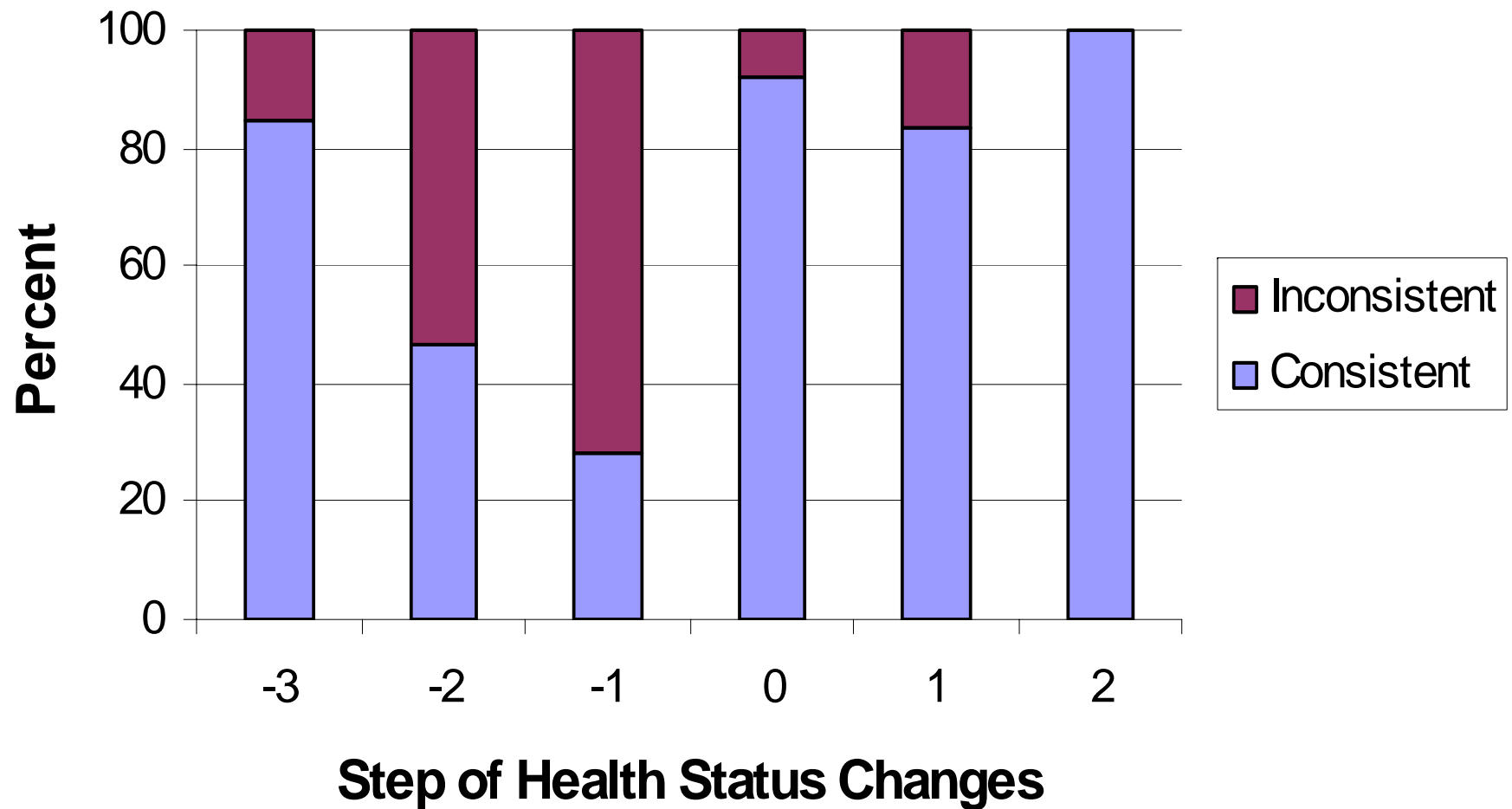
## Proportion of Inconsistent Cases by Types of Health Status Changes from Pre- to Post-Deployment



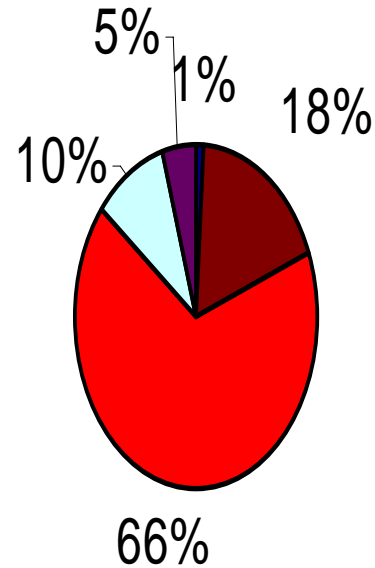
■ E~V ■ V~G ■ E~G ■ G~G ■ Others



## Inconsistency of Self-Reported Health Changes by Step of Health Status Changes

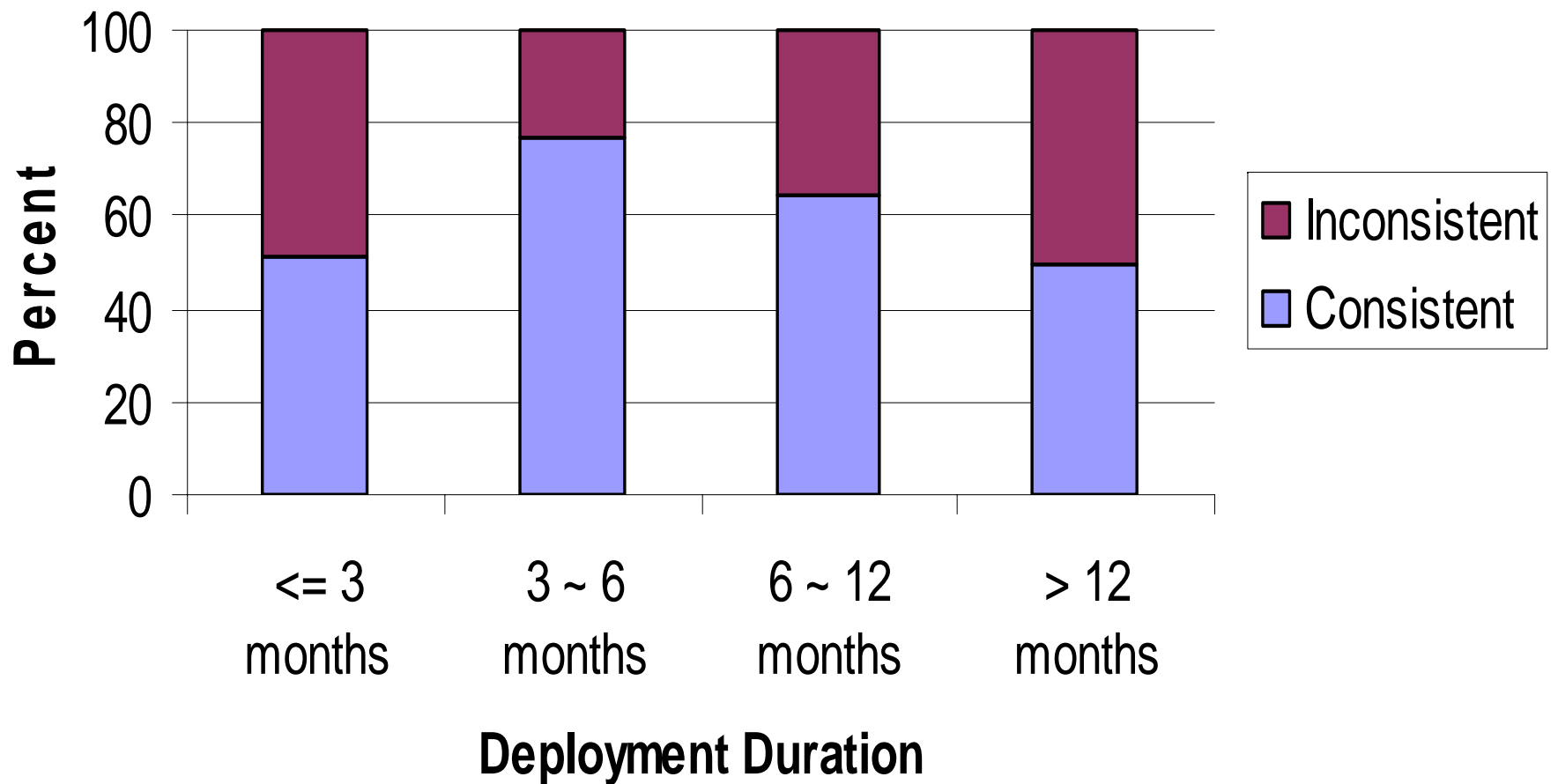


# Proportion of Inconsistent Cases by Step of Health Status Change

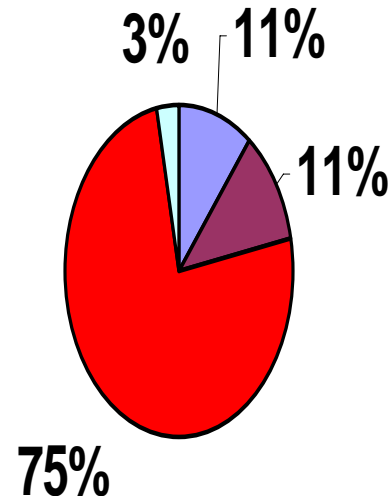


■ -3 ■ -2 ■ -1 ■ 0 ■ 1

## Inconsistency of Self-Reported Health Changes by Deployment Duration



# Proportion of Inconsistent Cases of Self-Reported Health Changes by Deployment Duration





# Incorporating Inconsistency of Self-Perceived Health Changes in Modeling

- Independent variables
  - Exposure indices (1<sup>st</sup> and 2<sup>nd</sup> orders)
  - Mental stress index
  - Post-deployment self-rated health status
  - Deployment duration
  - Pay Grade
  - Education levels
  - Age
  - Component (active, reserve and guard)
  - Sex
  - Race
  - Marital status
- Outcome types
  - Direct measure
  - Indirect measure
  - An unsure category
  - Delete unsure cases
  - Intelligent allocation

# Intelligent Allocation of Inconsistent Cases by Step of Health Status Change (SHSC)

Self-Perceived Health Changes		Direct Measure	
		Same/Better	Worse
Indirect Measure	Same/Better	291	30
	Worse	178	98

$V \sim E$   
 $G \sim V$   
 $F \sim G$   
 SHSC  $\geq 1$



SHSC = -1

$E \sim V$   
 $V \sim G$   
 $G \sim F$



SHSC < -1

$E \sim G$   
 $V \sim F$   
 $E \sim F$

SHSC = 0

$E \sim E$   
 $V \sim V$   
 $G \sim G$



# Comparison of the CART Models Using Different Types of Outcomes

Outcome Types	Health Change	Cases	Misclassified (%) Learn data	Misclassified (%) Test data
Direct measure	Same/better	482	22.0	23.4
	Worse	136	23.5	31.6
Indirect measure	Same/better	322	25.5	29.2
	Worse	282	16.7	19.5
An unsure category	Same/better	291	14.8	14.8
	Unsure	208	57.2	56.7
	Worse	98	39.8	42.9
Delete unsure cases	Same/better	291	14.8	14.8
	Worse	98	16.3	16.3
Intelligent allocation	Same/better	430	25.2	25.2
	Worse	157	14.7	14.7

# **“True” Percentage of Self-Perceived Declining Health Change**

- The “true” percentage obtained by only using the consistent cases is 25.2% (compared with 26.3% by the intelligent allocation).
  - The direct measure of 21% is about 4% under reported.
  - The indirect measure of 46% is about 20% over reported.



# Recommendations

- Avoid to use the indirect measure of self-perceived declining health change as an outcome (largely over reported and highly inconsistent).
- Be cautious to use the direct measure of self-perceived declining health change as an outcome (under reported and inconsistent).

# Recommendations (Cont'd)

- Identify and evaluate inconsistent cases
- Incorporate inconsistency of self-perceived declining health changes in data analysis and modeling (the intelligent allocation approach).

# Two Different Questions

- Are percentages of “health got worse” equal between the direct and indirect measures?
- Are the direct and indirect measure consistent?

